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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,562	11/14/2003	Kanu Chadha	3226.1021-001	8238

21005 7590 02/19/2008
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EXAMINER	
LEVITAN, DMITRY	
ART UNIT	PAPER NUMBER
2616	

MAIL DATE	DELIVERY MODE
02/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/713,562	CHADHA ET AL.	
	Examiner	Art Unit	
	Dmitry Levitan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *21-33,44-53,55 and 56* is/are allowed.

6)☒ Claim(s) *1-4,6,7,13-16,19,20,34-38,42,43 and 54* is/are rejected.

7)☒ Claim(s) *8-12,17,18 and 39-41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Amendment, filed 12/20/07, has been entered. Claims 1-4 and 6-56 remain pending.

Drawings

The drawings were received on 12/20/07. These drawings are approved.

Claim Objections

In light of Applicant's amendment, the objection to claim 27 has been withdrawn.

Claim Rejections - 35 USC § 112

In light of Applicant's amendment, the rejection of claims under first and second paragraphs of 35 U.S.C. 112 has been withdrawn.

Claim Rejections - 35 USC § 103

1. Claims 1-4, 7, 13, 19, 27, 34-36, 42 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imamura (US 6,801,586) in view of Bingham (US 5,206,886).

2. Regarding claims 1, 34 and 54, Imamura substantially teaches the limitations of claims:

A method, an apparatus and a system for reducing phase error in a pilot-based, frequency-division-multiplexing (FDM) receiver configured to receive FDM symbols from a remote source, each symbol including a data sub-carrier and a plurality of pilot sub-carriers

(OFDM receiver with time variations in propagation compensation, shown on Fig. 3 and disclosed on 3:17-6:26, wherein the received signal is shown on Fig. 6 and comprise pilot symbols), comprising:

simultaneously compensating the plurality of pilot sub-carriers and the data sub-carriers by an accumulated phase offset associated with a carrier frequency offset between the FDM receiver and the remote source (performing propagation path estimation/compensation by circuit 104, shown on Fig. 3 and 3:49-55, wherein the propagation path time distortion is estimated according to the pilot symbols, as shown on Fig. 1, 2 and 7, and disclosed on 1:21-52 and 5:60-6:26, as the compensation/phase shift of a pilot symbol results in simultaneously shifting all pilot and data carriers, as the pilot symbols are inserted at fixed intervals, as shown on Fig. 1, and the data symbols are synchronized to the pilot symbols. Also the OFDM receiver, shown on Fig. 3, is inherently associated with a remote source to transmit the signals, because the source of transmission is essential for the system operation);

calculating a residual phase offset for each of the plurality of corrected pilot sub-carriers (performing error correction by circuit 105, shown on Fig. 3 and disclosed on 3:53-57, wherein the error correction is estimated according to the information/data symbols, as shown on Fig. 1, 2 and 7, and disclosed on 1:21-52 and 5:60-6:26),

determining residual phase offset for the calculated residual phase offsets of the plurality of corrected pilot sub-carriers (performing error correction by circuit 105, as described above);

updating the accumulated phase offset using the residual phase offset (performing both corrections, as shown on Fig. 3 and 7, and described above); and

Imamura does not teach determining a mean residual phase offset for the calculated residual phase offsets of the plurality of pilot sub-carriers and rotation as a form of the symbol correction/compensation.

Bingham teaches determining a mean residual phase offset for the calculated residual phase offsets of the plurality of rotated pilot sub-carriers (calculating a Lest Mean Squared Error for pilot symbols 4:65-5:50 and performing a rotation correction operation 7:34-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add determining a mean residual phase offset for the calculated residual phase offsets of the plurality of rotated pilot sub-carriers of Bingham to the system of Imamura to improve the system efficiency by utilizing a LMS operation with pilot symbols to avoid using individual operations with each pilot offset.

In addition, regarding claim 34, Imamura teaches an accumulator storing an accumulated phase offset, as Propagated path estimated value update circuit 204, shown on Fig. 4, a first and a second multipliers 202 and 203, connected to the accumulator 204, operating as described above, and a processor, inherent to the system, to perform the operation, because using a processor is essential to the system.

3. Regarding claims 19 and 42, Imamura teaches the symbols in the system as OFDM symbols 1:5-45.

4. Regarding claims 2, 13 and 35, Imamura inherently teaches applying coefficients in the multiplication process to adjust the phase of the received symbols to compensate for the received offset 4:43-63.

5. Regarding claims 3, 4, 7 and 36, Imamura substantially teaches the limitations of claims 4 and 7 (see rejection of the parent claim for details).

Imamura does not teach calculating arctangent (claim 3) and fitting a curve technique to determine the pilots phase offset (claim 4) and use of LMS operation (claim 7).

Bingham teaches calculating arctangent 5:24-28, and fitting a curve technique to determine the pilots phase offset, as shown on Fig. 5 and disclosed on 6:49-55 and using LMS operation 5:37-42).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add calculating arctangent, fitting a curve technique to determine the pilots phase offset and use of LMS operation of Bingham to the system of Imamura to utilize well known solutions for calculating phase differences in OFDMA system.

6. Claims 6, 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Kolze (US 7,184,506).

Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above), including use of LMS operation (Bingham 5:37-42).

Imamura in view of Bingham does not teach using a slope indicative of the phase gradient versus frequency and utilizing zero-frequency crossing for indicating phase offset.

Kolze teaches using curve fitting, to indicate the phase dependency again frequency 11:30-36, shown on Fig. 10, including a ramp to characterize the phase dependency 12:1-34 and zero mean compensation 11:55-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using IEEE 802.11a standard of Kolze to the system of Imamura in view of Bingham to utilize well known solutions for calculating phase differences in OFDMA system.

7. Claims 20 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Admitted Prior Art (current application, [0004]).

Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above).

Imamura in view of Bingham does not teach using IEEE 802.11a standard.

Admitted Prior Art teaches using IEEE 802.11a standard, as disclosed on [0004].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using IEEE 802.11a standard of Admitted Prior Art to the system of Imamura in view of Bingham to improve the system compatibility with existing standards.

8. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Rosenlof (US 6,546,056).

Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above).

Regarding claims 14 and 15 Imamura in view of Bingham does not teach rotating sub-carriers into predetermined region corresponding to +1 decision region of BPSK.

Rosenlof teaches using rotating the received carriers to compensate their phase offset into the midpoint of their sampling area to restore the initial phase values 6:53-7:28, inherently including +1 value for BPSK constellation, because restoring +1 decision area is essential for the restoration of the constellation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using rotating sub-carriers into predetermined region corresponding to +1 decision region of BPSK of Rosenlof to the system of Imamura in view of Bingham to improve the system compensation for the BPSK constellation offset.

Regarding claim 16, Imamura in view of Bingham does not teach using detecting and compensating sampling timing errors.

Rosenlof teaches using detecting and compensating sampling timing errors (detecting and compensating sampling offsets 6:21-43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using detecting and compensating sampling timing errors of Rosenlof to the system of Imamura in view of Bingham to improve the system operation with sampling offsets to increase the quality of the reception.

Allowable Subject Matter

9. Claims 21-33, 44-53, 55 and 56 are allowed.

10. Claims 8-12, 17, 18 and 39-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

1. Applicant's arguments filed 12/20/07 have been fully considered but they are not persuasive.

On page 19 of the Response, Applicant argues that Imamura teachings are directed to compensating propagation path effects, different from compensating carrier frequency offsets of the current application.

Examiner respectfully disagrees.

Imamura teaches an OFDM system to compensate for time variations/offsets due to the transmission path effect, as clearly disclosed in the Summary of the invention on 1:55-2:3.

Current application is directed to the mitigating time variations/offset due to the same effects associated with the transmission path, as disclosed in Abstract .

On page 19 of the Response, Applicant argues that Bingham does not teach a method and an apparatus allowing simultaneous rotation of pilot and data subcarriers.

Examiner respectfully disagrees.

Imamura, not Bingham, teaches a method and an apparatus allowing simultaneous rotation of pilot and data subcarriers (see rejection of claims 1, 34 and 54 above).

Applicant's arguments, directed to the portions of Bingham teaching are irrelevant, because Examiner used the other portions of Bingham teaching in the claims rejection.

On page 19 of the Response, Applicant argues that modifying the Bingham apparatus would not be obvious to a person skilled in the art.

Examiner respectfully disagrees.

It was Imamura, not Bingham, apparatus/method, what was modified in view of Bingham. Both methods/apparatuses of Imamura and Bingham are directed to the OFDM receivers compensating the timing/offset error in the received carriers and are obvious to be combined for the reasons indicated in the claim rejection above.

Conclusion

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dmitry Levitan whose telephone number is (571) 272-3093. The examiner can normally be reached on 8:30 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DL

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